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HAZARD RATING, PREDICTED LOSSES, AND CONTROL ALTERNATIVES FOR SOUTHERN PINE BEETLE DAMAGE ON RARE II PROPOSED WILDERNESS AND FURTHER STUDY AREAS ON THE NATIONAL FORESTS IN TEXAS

by

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INTRODUCTION

The southern pine beetle (SPB), Dendroctonus frontalis Zimmermann, is the most destructive insect pest of pines on the National Forests in Texas. It is capable of destroying millions of board feet of timber in a matter of months. Although SPB populations have fluctuated erratically in the past, recent outbreaks have occurred more rapidly and persist for a longer duration (Hedden 1978). This may be due to the fact that SPB prefers well to densely stocked, slow growing, pure pine stands (Belanger 1981) and there are more of these types of stands on National Forests now than in the past.

The last major peak in SPB activity in Texas occurred in 1976 (Overgaard 1976). However, in 1982, there was a significant increase in the number of infestations on the Yellowpine, Angelina, and Raven Ranger Districts (Nettleton and Overgaard 1982). This has created some concern that another SPB epidemic may be imminent. In response to a request by the Supervisor's Office of the National Forests in Texas, Forest Pest Management has evaluated the potential hazard, projected future losses, and suggested possible control alternatives for SPB on the Little Lake Creek, Big Slough, and Turkey Hill RARE II Proposed Wilderness Areas and the Chambers Ferry, Graham Creek, and Four Notch Further Study Areas.

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HAZARD RATING

These six deferred areas were hazard rated in order to evaluate the potential risk of SPB attack. The system used was developed by Dr. Peter Lorio of the Southern Forest Experiment Station. It utilizes Continuous Inventory of Stand Conditions, an automatic data processing system used by the National Forests in Region 8 to inventory and manage timber stands, and assigns a rating of high, medium, or low hazard to each stand.

The percentage of pine type acres in each hazard rating class was determined and is summarized in figures 1 and 2. Excluding the Graham Creek Further Study Area, each tract contained more than 85 percent of its acres in high and medium hazard classes. This indicates that when SPB infestations occur in these areas, they will be more frequent, cause greater loss of resources, and produce more beetles than stands that are younger and managed for vigorous growth.

Most National Forest ranger districts in Texas average less than 30% of their total acreage in the high and medium hazard classes. The comparison, then, between these deferred areas on the National Forests in Texas and managed National Forest land would indicate that the deferred areas are three to four times more likely to incur SPB attack than other lands managed by the USDA Forest Service.

PREDICTED LOSSES

Using a technique developed by Dr. Garland Mason of Stephen F. Austin University, future losses from SPB can be projected based on historical information. The number of infestations and trees expected to be killed within a given area can be estimated for a five year period by considering the hazard class of the stands.

We have projected that 259 spots will occur in the deferred areas of the National Forests in Texas during the period 1983-1988. Historical records from private and National Forest lands in east Texas reveal an average spot size (at time of control) of 21 trees in low hazard stands, 20 in medium, and 90 trees in high hazard areas. Based on these considerations, we estimate that 5,422 MBF (table 1) of timber will be killed in these areas during the next five years. Records on which the east Texas projections were based, in general, included only trees containing living beetles in "active" spots. Additional losses of vacated trees and green, uninfested buffer trees in controlled spots and trees killed in inactive spots are not included in these data. Therefore, actual volume loss could exceed the tabular figure (5,422 MBF) by a factor of 2-5 times (Mason 1980).

Managed timber stands adjacent to the deferred areas are susceptible to SPB losses due to the increase and overflow of the SPB population from these areas. Control action can be used to prevent the spread of a SPB infestation directly onto managed timber or to eliminate reservoir centers

Figure 1. Percentage of pine type acres in the Further Study Areas on the National Forests in Texas by SPB hazard class, April 1983.

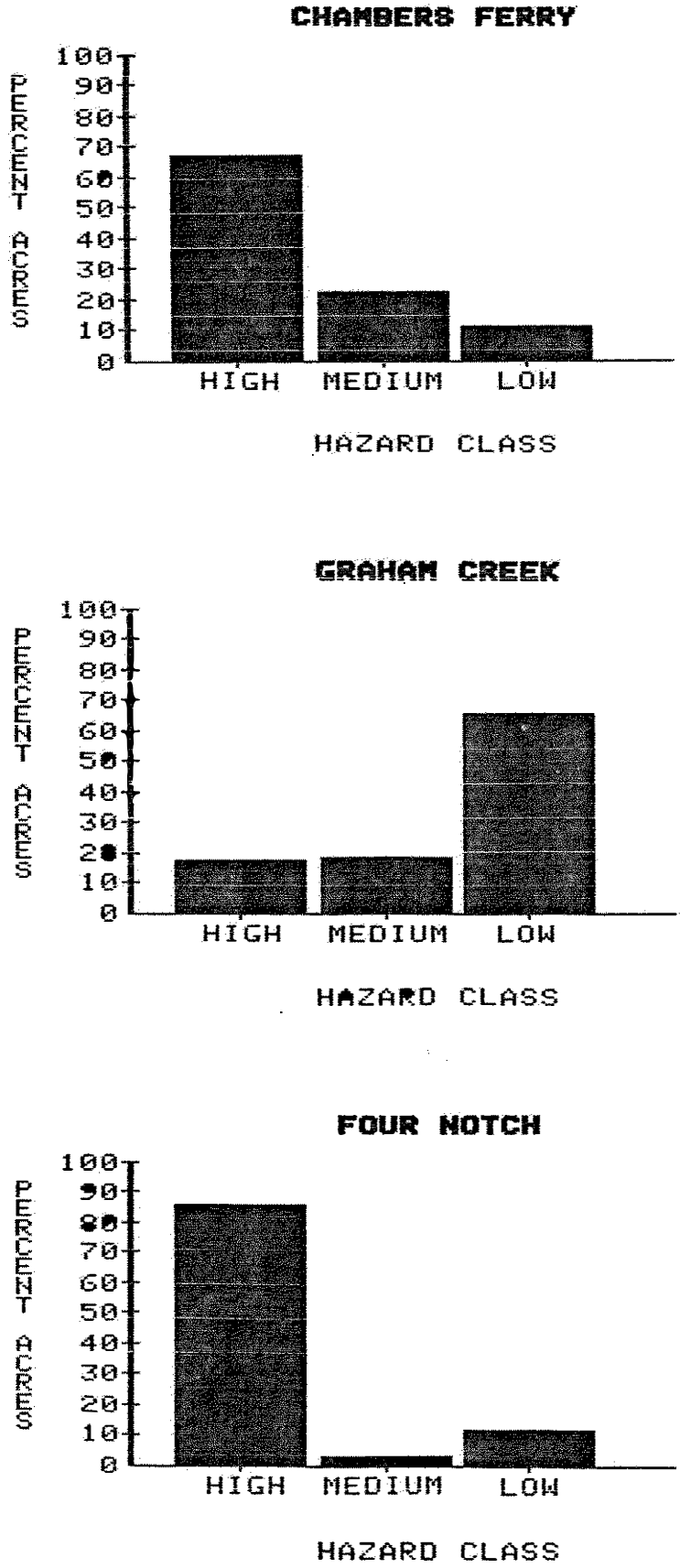

Figure 2. Percentage of pine type acres in the RARE II Proposed Wilderness Areas on the National Forests in Texas by SPB hazard class, April 1983.

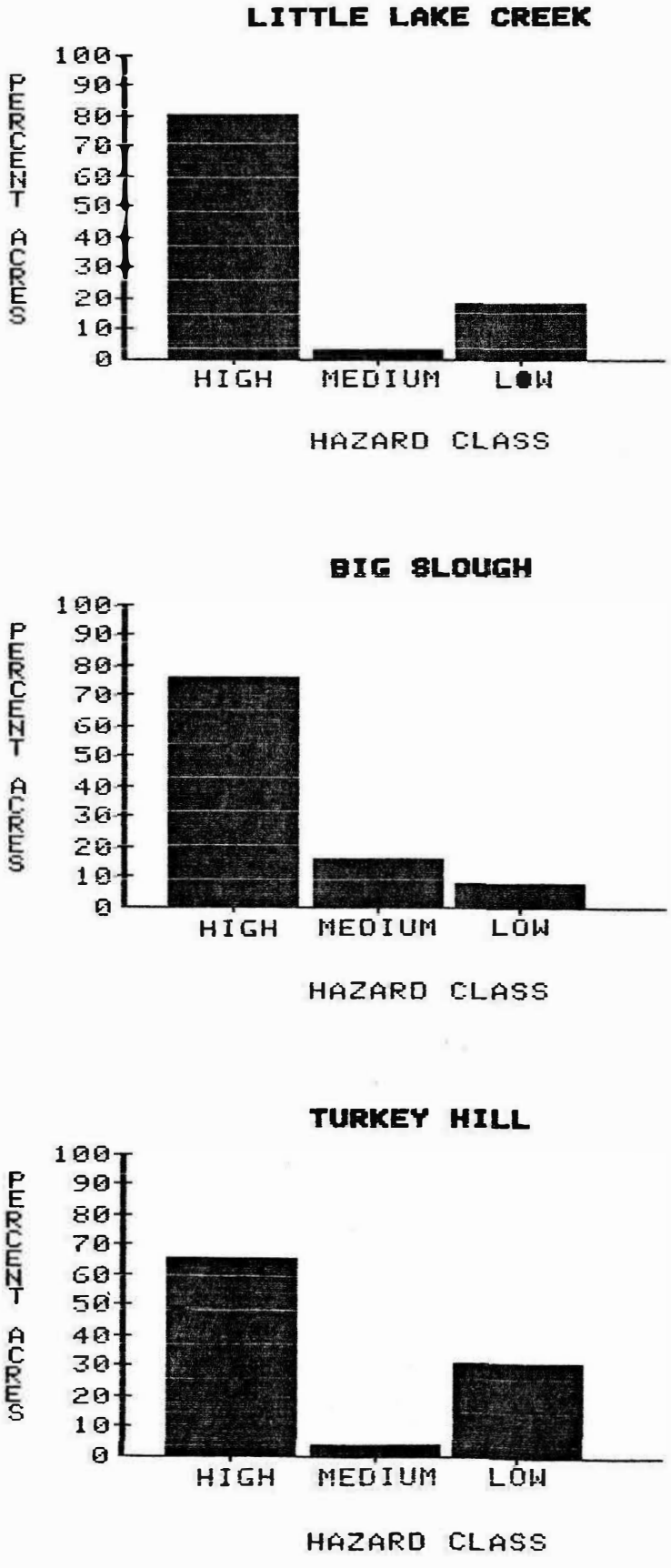

Table 1. Projected SPB losses for the five year period 1983-1988 on the RARE II Proposed Wilderness and Further Study Areas on the National Forests in Texas.

	Total Size (Acres)	Number of Infestations	Number of Trees Lost	Volume Lost (MBF) [a/] [b/]
Little Lake Creek	2,700	34	2,834	794
Big Slough	4,593	18	1,442	404
Turkey Hill	2,919	28	1,566	438
Chambers Ferry	4,661	59	4,421	1,238
Graham Creek	7,766	36	1,967	551
Four Notch	5,605	84	7,132	1,997
TOTAL	28,244	259	19,362	5,422

[a/] Based on average stand conditions from each site determined during the 1982 biological evaluation

[b/] Scriber Decimal C Log Rule

for SPB population buildup. However, control of SPB infestations will not prevent new spots from occurring. The large amount of high hazard acreage on the deferred lands indicates that SPB will continue to be a problem until the overall hazard is lowered. This will not happen until a change in stand composition reduces the percentage of overmature, densely stocked stands of loblolly and shortleaf pine.

DIRECT CONTROL ALTERNATIVES

Control of the SPB in proposed wilderness areas and further study areas is usually approached by protecting managed timber stands which are near the infestations in question. Salvage, chemical control, cut-and-leave, and pile-and-burn techniques are proven methods of controlling the growth and spread of individual SPB infestations.

Ideally, the control decision should be made on each SPB infestation by asking these questions:

1) Are the infestations located in a further study or proposed wilderness area that is less than 5,000 acres or is the infestation within one linear mile of managed timber?
   Yes No

2) Is susceptible host material available for infestation between the infestation and managed timber (i.e., no natural barrier such as a hardwood stand)?
   Yes No

3) Using the guide developed in Texas (Billings & Hynum 1980) does the spot have the potential to grow into managed timber?
   Yes No

   If not, will the infestation grow to > 100 active trees during the summer season?
   Yes No

If the answer to questions one and two are "Yes" and either of the parts to question three are answered "Yes", then the infestation (spot) should be controlled. The control options are listed below:

Alternative 1 - No Action. Under this alternative, it is expected that the SPB infestation would continue to spread and destroy many of the aesthetic characteristics for which these further study and proposed wilderness areas were selected. If unchecked, the beetles would create large openings of dead snags and scrub brush and greatly reduce the overall pine component. Infestations would likely spread to adjacent areas of both public and private land or serve as epicenters for population expansion. Liabilities for damage could be involved.

Standing snags create a safety hazard to visitors to the areas. Violations of the Texas Forest Pest Law are likely.

Alternative 2 - Removal of infested trees and buffer strip of uninfested trees by commercial sales. When infested and buffer strip trees of merchantable size are accessible (skidding distance is a quarter of a mile or less to a road), they could be removed by commercial sale. Logging of the infested material should begin immediately. Where needed, a 40 to 70 foot buffer strip will be marked and cut adjacent to and ahead of the most recently infested trees. The order of priority for removing infested timber will be as follows:

a. Trees in the buffer zone. A 40 to 70 foot buffer strip of uninfested green trees around the head of the spot is recommended for removal to minimize reinfestations and to disperse the beetles. The width of buffer zone should be approximately equal to the height of the stand being treated. With weekly monitoring of the spot after control, the buffer strip could be made even smaller or eliminated.

b. Infested green trees. This removes the SPB pheromone source and potential brood.

c. Faders. This removes potential brood.

d. Red-topped. These trees contain living brood during fall and winter and should be removed. It is not necessary to remove these trees during the warmer summer months when developmental rates are much faster.

Alternative 3 - Chemical Control. Chemicals recommended for SPB are Lindane, Dursban, and Sumithion. Formulation mixtures are shown on labels. Cut, limb, buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A hand compressed air sprayer is an ideal applicator. Infested logs should be turned three times to insure complete treatment of infested bark. Spray cut stumps and bark removed by woodpeckers.

The order of priority for cutting and spraying infested trees in large spots is the same as stated in Alternative 2. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts", every effort will be made to locate and treat all green infested trees during the chemical control operation.

Trees from which the brood have emerged will not be sprayed so that natural enemies of the SPB can complete their development.

Alternative 4 - Cut-and-Leave. Cut-and-leave is designed to disrupt spot growth in small to medium-sized spots (less than 50 active trees) by dispersing emerging beetles. The following procedure is to be followed when cut-and-leave is applied.

(1) Identify all active trees within the spot.

(2) Fell all active trees toward the center of the spot.

(3) Fell a horseshoe-shaped buffer strip of green, uninfested trees around the most recently attacked trees at the head of the spot and leave them lying on the ground with crowns pointed toward the center of the spot. The buffer should be no wider than the average height of the trees in the spot.

(4) Dead trees from which all SPB have emerged need not be felled. Cut-and-leave treatments, for best results, should be applied during the summer months only (June-October).

In spots > 50 active trees, where cut-and-leave is the only treatment option, cut-and-leave can be administered. Each spot treated must be checked at one week intervals for 4 weeks and treated again, if necessary.

(4) Alternative 5 - Pile-and-Burn. Felling, piling, and thoroughly burning the bark of infested trees is one of the oldest methods of controlling SPB. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling and burning infested trees, particularly in large spots, is the same as stated above under removal of infested trees by commercial sale. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts", every effort will be made to locate and treat all green infested trees during the piling and burning operation. Burning should not be done if it will result in soil erosion.

Alternative 6 - A combination of 2, 3, 4 & 5. This alternative covers all the situations and control measures to detect and control the SPB.

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PRECAUTIONARY STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in their original containers under lock and key out of reach of children and animals, and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear appropriate protective clothing.

If your hands become contaminated with a pesticide, wash them immediately with soap and water. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove the clothing immediately and wash skin thoroughly. After handling or spraying pesticides, do not eat or drink until you have washed with soap and water.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicide from equipment, do not use the same equipment for insecticides or fungicides that you used for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary landfill dump, or crush and bury them in a level, isolated place.

NOTE: Some states have restrictions on the use of certain pesticides. Check your state and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Environmental Protection Agency, consult your county agent, state extension specialist or FPM to be sure it is still registered for the intended use. For further information or assistance, contact Forest Pest Management, Alexandria Field Office, Pineville, La., 71360, (Telephone: FTS 497-7280, or Commercial 318/473-7280).

Southern Pine Beetle

Guide for Predicting Timber Losses from Expanding Spots in East Texas

by

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TEXAS FOREST SERVICE
A Part of
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Many southern pine beetle infestations (SPB spots) enlarge during warm months if no direct control is applied. Other spots are abandoned by emerging beetles soon after detection with little or no additional loss of trees. The extent of timber losses from spot expansion will depend on the initial size of the infestation and the density (basal area) of the stand. The following steps describe how to predict tree and dollar losses from spot spread over a 30 day period during summer months. This estimate is useful for making better control decisions.

1. Examine the spot to determine if trees with fresh SPB attacks (stage 1) are present. See USDA Agricultural Handbook 558 for details. If there are no fresh attacks, no additional spot spread is likely to occur and the spot will probably be inactive within 30 days.

2. If freshly-attacked trees are present, count or estimate the total number of active trees in the spot. Active trees include trees with fresh attacks (stage 1) as well as those with SPB larvae, pupae or new adults (stage 2).

3. Estimate the stand basal area (in ft^2/acre) at the active head(s) of the spot, using a 10 factor prism. (Stand basal area = basal area of pines + hardwoods.)

4. From Table 1 (on reverse side) determine the additional tree losses to be expected after 30 days. *This estimate does not include the trees already dead or currently infested with beetles.*

5. To estimate the dollar loss to be expected from spot expansion over the next 30 days, use the following formula:

Expected dollar loss = A x B x C

where:

A = additional trees killed from Table 1.
B = average volume per tree.
C = stumpage price per unit volume.

6. For a given spot, the value in Table 1 for "trees remaining active" is an estimate of the number of active trees to be expected at day 30. This value, when compared to number of active trees at day 0, indicates whether the level of beetle activity in the spot is likely to increase or decrease if no control is applied.

Example Of How To Figure Dollar Losses

Question: What are the tree and dollar losses to be expected after 30 days from a spot of 75 active trees in a uniform sawtimber stand of 150 ft^2/acre basal area if average volume/tree = 100 bd. ft and stumpage price = $250/MBF?

Answer: From Table 1, additional trees killed after 30 days = *62.*

Additional dollar loss = (62 trees) x (100 bd. ft/tree) x ($0.25/bd. ft) = *$1550.*

In other words, if this spot is not controlled, the landowner can expect to loose 62 more trees in the next 30 days, valued at $1550. This loss is in addition to trees already infested or dead.

TABLE 1

Additional Timber Losses To Be Expected From Spot Growth Over 30 Days During Summer in East Texas[1]

Number of Active Trees At Day 0[2]		Total Stand Basal Area (ft²/acre)			
		20-60	70-110	120-160	170-210
		Predicted Value at Day 30			
5	Additional trees killed[3]	0	0	0	0
	Trees remaining active[4]	≤ 1	≤ 1	≤ 1	≤ 1
10	Additional trees killed	0	0	2	5
	Trees remaining active	≤ 2	≤ 2	4	7
20	Additional trees killed	0	5	12	18
	Trees remaining active	≤ 4	9	16	22
30	Additional trees killed	2	12	21	30
	Trees remaining active	8	18	27	36
50	Additional trees killed	9	24	39	54
	Trees remaining active	18	33	48	63
75	Additional trees killed	16	39	62	84
	Trees remaining active	30	53	76	98
100	Additional trees killed	24	54	84	115
	Trees remaining active	43	73	103	134

[1]To be used for evaluating spots in East Texas during months of June-October only.

[2]Number of stage 1 + stage 2 trees present when spot growth prediction is made.

[3]Predictions for "additional trees killed" derived from Texas Forest Service spot growth model (based on 1975 data):

$$ATK = [(0.000202\ IAT \times TBA) - 0.2211] \times 30$$

where ATK = number of additional trees killed by day 30
IAT = number of active trees at day 0
TBA = total basal area in ft²/acre

[4]Predictions for "trees remaining active" (TRA) based on SPB developmental rate of 37 days and formula:

$$TRA = ATK + \frac{7}{37}(IAT)$$